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DEPARTMENT OF THE ARMY
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The occurrence of canine piroplasmosis in the occupied eastern areas.

by K. Enigk.

Deutsche Tropenmedizinische Zeitschrift, 48: 88-93 (1944).

In the spring of 1943, two veterinary officers of the Army Veterinary Research Office reported that the manifestations of piroplasmosis had been seen on several dogs in the vicinity of Brjansk and Spass-Demensk. Unfortunately the demonstration of the pathogen was not undertaken. However, the clinical diagnosis was supported by the rapid recovery of the dogs after treatment with acaprin. The occurrence of canine piroplasmosis in this region of Russia is not known in the literature. To date, canine piroplasmosis has been found, in Russia, in the Transcaucasus, in the vicinity of Kiew, Saratow, Kuibyschew, Kasan and one case in Leningrad, as well as in Siberia, near Omsk, Tjumen and Uralsk. In Russia, the vectors are assumed to be Rhipicephalus sanguineus and Dermacentor marginatus (Belitzer and Markoff 1930, Yakimoff 1931, Markow et al. 1935). Neither of these ticks is found in Central Russia. In the eastern areas occupied by us, Rhipicephalus sanguineus is native only to the coast of the Black Sea, while Dermacentor marginatus also occurs only in Southern Russia. The most northerly point of its incidence is Bjelgorod. In Central Russia the canine and large mammalian parasites are limited to Dermacentor pictus and Ixodes ricinus. The latter type is found also in Southern Russia. These data are based on our own identifications of 271 consignments which in part encompass several hundred ticks and which had been collected from horses and dogs by the troops of the eastern front and sent to the Army Veterinary Research Office. Table 1 lists the carriers of canine piroplasmosis known to date. It shows that Dermacentor pictus and Ixodes ricinus have not been known to be vectors of Piroplasma canis in the past. If canine piroplasmosis really occurs in Central Russia, one of these two ticks must be the carrier. In order to clarify this question, transmission tests were conducted with both types of tick. Dr. Kikuth, Wuppertal-Elberfeld, has made available to us the strain of Piroplasma canis utilized by us.

The specimens of Dermacentor pictus with which the transmission tests were conducted, had been sent from the vicinity of Beressnewo, north of Smolensk. Nymphs of this tick were attached to a dog experimentally infected with Piroplasma canis. The imagos developing from these animals were attached to another dog for feeding. On the 7th day, this dog revealed Piroplasma canis for the first time.

Nymphs of Ixodes ricinus collected in a forest near Finkenkrug, west of Berlin, were attached to an infected dog. The sexually mature ticks developing from them were fed on a different dog. Piroplasmae were never demonstrated in this dog during the observation time of six weeks. In a subsequent transmission test the dog proved to be more susceptible.

Table 1. Vectors of Piroplasma canis known to date.

Tick species	Determined by	Experimentally established transmission L.N. I.L.N.I.
Dermacentor marginatus	Brumpt 1919	X - - →
	Belitzer and Markoff 1930	X - - →
	Regendanz and Reichenow 1932	X - → →
Dermacentor venustus	Brumpft and Larrousse 1922	X - - →
Rhipicephalus sanguineus	Christophers 1907	X - → →
	Brumpt 1919	X - - →
	Reichenow 1935	X → → →
	Shortt 1936	X →
		X
Haemaphysalis leachi	Lounsbury 1904	X - - →
	Brumpt 1938	X →

Even if only one test had been conducted, it may still be said that Ixodes ricinus most probably cannot be considered a carrier of canine piroplasmosis, since in the large areas of dissemination of this tick in Central and Northern Europe, canine piroplasmosis does not occur. The extent to which canine piroplasmosis may occur in Central and Northern Europe depends on the clarification of the question whether the resistance of Piroplasma canis in the tick to cold is so great as to survive the winter temperatures prevailing in the areas discussed. The lowest observed vital temperature of ticks infected with Piroplasma canis has been reported at -5°C (Regendanz 1932). The large equine piroplasma, Piroplasma caballi, can survive a temperature of -15°C. Tests at lower temperatures have not been conducted (Enigk 1944). It is likely that Piroplasma canis possesses a similarly high resistance to cold. This question is significant also in connection with the newly established vector Dermacentor pictus, for the area of dissemination of this tick in the occupied eastern areas is the Central Russian forest. The northernmost occurrence of the test material is 50 km south of Leningrad, but Dermacentor pictus occurs only sporadically north of St. Aja Russa. The southern border runs north of Kiew to Kursk and coincides here with the end of the Central Russian forest belt. The major area of dissemination is enclosed by the cities Smolensk, Orel and Korosten. Here the tick is found in the forest and on moist meadows, and this very frequently. Dogs are quite often afflicted with this tick. The preliminary conditions for the occurrence of canine piroplasmosis also exist in this area. The sexually mature ticks of Dermacentor pictus occur in Central Russia from mid-April to mid-June and from mid-August to mid-November. Piroplasmosis may therefore occur as late as late fall. I was able also to find Dermacentor pictus in Southern France, near Bayonne, Bordeaux, Limoges, Poitiers

and frequently do not reproduce early enough in the salivary glands in the nymph stage (Regendanz and Reichenow 1932).

If, therefore, Hyalomma marginatum probably does not have a greater practical significance as vector of Piroplasma canis, the fact that it can be a vector is nevertheless of biological interest. In contrast to other types of Piroplasma, of which only one or two vectors are known, four vectors from three different tick genera have been established to date for Piroplasma canis. On the basis of the present tests this number is raised to six species from four genera. The intermediary host specificity of Piroplasma canis therefore is relatively indistinct. Reichenow in 1935 and 1940 assumed that the large canine piroplasma designated as Piroplasma canis does not represent a single species, but that several species of piroplasma exist which differ only slightly in their morphology and pathogenity, having different vectors, however. For the piroplasma transmitted by Rhipicephalus sanguineus he invents the new species Piroplasma vogeli. The strain of Piroplasma canis used in the tests above is transmitted by Rhipicephalus sanguineus, as reported by Dr. Kikuth. In our own tests this strain of Piroplasma was transmitted by Dermacentor pictus and Hyalomma marginatum. The piroplasma thus is capable of developing in three species of ticks belonging to three different genera. It has been shown, therefore, that there is no narrow intermediary host specificity in connection with the large canine piroplasma.

A note concerning the intrauterine transmission of Piroplasma canis shall be added here. A bitch was experimentally infected with Piroplasma canis on 30 July 1943. The infection was accompanied by a brief fever. The piroplasma was found in the blood daily between 3 August and 16 August. Subsequently it was found but rarely. On 2 November the bitch gave birth to 10 young. Blood from two of these pups was transfused at age 5 and 12 days, respectively, to two other dogs susceptible to Piroplasma canis. A piroplasmic infection did not occur in these animals. Two other pups sacrificed at age 3 and 24 hours, respectively, failed to yield piroplasma in smears of organs of the abdominal and thoracic cavities or the bone marrow. Thus no intrauterine transmission of Piroplasma canis took place in these animals. This result coincides with findings in connection with other domestic animals. A passive intrauterine transmission of blood parasites occurs only when pathological changes are present in the placenta, a reason why a transfer of infection to the fetus normally is seen only in abortions or premature births (Enigk 1942). The findings of Sen 1931 are also to be interpreted in this sense. He observed, in India, an intrauterine transmission of Babesia gibsoni, the small canine piroplasma.

Summary.

1. Dermacentor pictus and Hyalomma marginatum are identified as new vectors of Piroplasma canis.

2. Corresponding to the dispersion of Dermacentor pictus, canine piroplasmosis may occur in Central Russia. In France, the tick probably is the vector of socalled "winter piroplasmosis" of the dog.

3. Hyalomma marginatum has a lesser significance as vector of canine piroplasmosis, since it rarely afflicts the dog in its imago stage.

4. An attempt at transmission with Ixodes ricinus had negative results, also two tests each with Rhipicephalus bursa and Hyalomma dromedarii.

5. In the case of a premune bitch, Piroplasma canis was not transmitted to the young inter uterum.